DOCUMENT RESUME

ED 267 121 TM 860 213

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TITLE Assessing Reasoning and Communicating Skills in College.
PUB DATE 17 Apr 86
NOTE 19p.; Paper presented at the Annual Meeting of the American Educational Research Association (70th, San Francisco, CA, April 16-20, 1986).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Abstract Reasoning; *Cognitive Processes; Cognitive Tests; College Freshmen; College Seniors; *Communication Skills; *Equated Scores; Higher Education; Speech Skills; Standardized Tests; Test Reliability; *Test Validity; Writing Skills
IDENTIFIERS *American College Testing Program; *College Outcome Measures Project

ABSTRACT

Assumptions have been made about the growth and development of reasoning and communicating skills in college. This study describes a standardized set of assessments of reasoning, writing and speaking with norms for freshmen and seniors and multiple equated forms. The study provides evidence of the validity and reliability of these assessments. Utilizing data for 1589 freshmen and 1366 seniors at 13 institutions, an examination of interrelationships of these three scales yielded correlation coefficients ranging from .35 to .51. Correlations with ACT scores, grade point averages, and Reading scores were also at modest levels. For seniors, no meaningful differences in means were found by age group or area of interest, although women evidenced higher means than men on all three scales. Substantial differences in sample means for 10 freshman samples and 13 senior samples were observed for all scales. Cross-sectional comparisons of freshman and senior samples at six institutions suggested that students at some schools evidenced almost twice as much growth as samples at other schools. Senior mean level of proficiency in reasoning suggests that college impact on skill development may be less than institutions might wish. (Author/PN)

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ASSESSING REASONING & COMMUNICATING SKILLS IN COLLEGE

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Abstract

Many assumptions have been made about the growth and development of reasoning and cummunicating skills in college. This study describes a standardized set of assessments of reasoning, writing and speaking with norms for freshmen and seniors and multiple equated forms. The study provides evidence of the validity and reliability of these assessments, which are based on three writing and three speaking samples per examinee. Utilizing data for 1589 freshmen and 1366 seniors at 13 institutions, an examination of interrelationships of these three scales yielded correlation coefficients ranging from .35 to .51. Correlations with ACT, GPA and Reading scores were also at modest levels. For seniors, no meaningful differences in means were found by age group or area of interest, although women evidenced higher means than men on all three scales.

Substantial differences in sample means for 10 freshman samples and 13 senior samples were observed for all scales. Cross-sectional comparisons of freshman and senior samples at six institutions suggested that students at some schools evidenced almost twice as much growth as samples at other schools. While growth was shown on all scales, the senior mean level of proficiency in reasoning suggests that the impact of college on the development of such skills may be less than many institutions might wish.

April 17, 1986

Presented at the 1986 Annual Meeting of the
American Educational Research Association
in San Francisco

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ASSESSING REASONING & COMMUNICATING SKILLS IN COLLEGE

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The national concern for proficiency in writing has had an impact at all levels of education. Many colleges have developed or utilized some measure of writing proficiency to monitor the effectiveness of their programs. Much less attention has been given to proficiency in speaking, although some interest has recently been shown in this area. However, only one study has been published which measures on a nationally available instrument the amount of growth in both writing and speaking competence over the period of a semester of communication instruction. (Trank & Steele, 1983) No study has reported the amount of growth in reasoning skills associated with a college course in either writing or speaking.

Currently, interest in the relationship between reasoning and communication skills has been growing. Studies at the high school level have led the way. The National Assessment of Educational Progress opened this decade with their report Reading, Thinking and Writing. This study found that 17 year olds in the national sample, while more sophisticated in writing skills than younger students, did not evidence a corresponding increase in sophistication in analytic skills. The Winter 1984 issue of the Review of Educational Research was devoted to articles on the teaching and learning of reasoning skills. Arthur Applebee's article in this issue on "Writing and Reasoning" provides a number of insights into why reasoning skills have shown little development over the high school years. "The nature of the relationship between writing and reasoning has been one of the unexamined assumptions in the study of writing instruction" is his conclusion. College faculty are showing an increased concern in addressing this relationship. A series of institutes sponsored by the University of Chicago Office of Continuing Education on Cognitive Strategies and Writing have been held this year for colleges emphasizing writing across the curriculum. The Center for Guided Design under the direction of Charles Wales at West Virginia University has concerned itself for several years with techniques for emphasizing reasoning, especially in natural and social science courses. The work of Lochhead and Whimbey in developing problem solving and quantitative thinking skills has contributed to an increased emphasis on reasoning in both high school and college. While these efforts highlight a widening interest and concern, there is a need for empirical research on the impact and effectiveness of various strategies for developing reasoning skills.

The lack of study of the relationship of reasoning and communication skills is understandable. Techniques for assessing writing and speaking samples have only recently reached the point of practical large-scale application. Trends in developing such assessments have caused most to focus on the assessment process rather than on the student and the act of thinking. Concerns for efficiency and reliability seem to have caused many to choose tasks and scales that

require the least time and training rather than yield the richest and most meaningful information. Concerns for processing and sorting students sometimes appear to have overridden concerns for utility and effectiveness in instruction. Finally, the extensive public concern over communication skills may have shifted attention and efforts away from the development of reasoning skills that ultimately make speaking and writing worthwhile.

The Speaking and Writing Assessments developed by ACT's College Outcome Measures Program (COMP) offer a contrast to current trends in communication assessment. Because of its focus on a broad assessment of the general education outcomes of college, COMP offers ways to collect writing and speaking samples that include responses to reasoning tasks. While the Communicating scales have been made available for independent use (separate from the broader assessment of general education outcomes) for several years, only recently have the reasoning scales been studied for use concurrently with the assessment of speaking and writing.

Previous studies of proficiency in communication skills in the United States have typically attempted to attribute any gains identified to rhetorical components of instruction. Protocols have been analyzed to examine ways in which students have become more sophisticated in communication techniques and gained more control over the medium. What the COMP assessments will allow is a joint examination of the use and improvement of reasoning skills (to gain more control over the content) in addition to the use and improvement of communication skills (to more skillfully and persuasively communicate that content).

PURPOSE

In order to move ahead with such a joint analysis of reasoning and communicating, there must be assurance that the two sets of scales are reliable, that they measure different domains, that they adequately differentiate levels of skill, and that they can differentiate among differing programs. The purpose of the research reported in this paper was to examine the relationship between the reasoning skills and communication skills assessed by COMP, relationships with other relevant variables, the level of development of such skills in college freshmen and seniors, and variations among college programs.

DESCRIPTION OF THE INSTRUMENTS

The COMP assessments of speaking and writing are defined as the ability to communicate about social institutions, science and technology, and the arts. Written and audiotaped stimuli are used as a context for role-playing tasks in which participants speak to a friend, to an informal group, and at a formal meeting or write letters to a friend, a legislator, and an administrator. Each task calls for endorsing a particular point of view and developing several specified points into a persuasive argument. Thus three writing samples and three speaking samples are obtained in a variety of realistic contexts. In both speaking and writing assessment, equal emphasis is given to rhetorical concerns (discourse or organization of ideas), psychological concerns (making contact with and attending to the perspective of the

relevant audience), and practical concerns (such as using vivid language and illustrations to dramatize and create an effect). Little emphasis is given to formal errors such as mispronounced or misspelled words, hesitation or punctuation, unless they noticeably detract from or obscure the message. Qualitatively defined scales at five levels of proficiency for each of the three criteria (Discourse or Organization, Audience, and Delivery or Language) result in a 36 point scale for both speaking and writing.

The COMP assessment of reasoning skills embedded in the writing tasks is defined as the ability to solve social, scientific - technological, and artistic problems and to clarify social, scientific, and artistic values. The assessment calls for the identification and discussion of reasonable and appropriate benefits, problems, and potential solutions related to the point of view called for in each of the three writing tasks. Similarly, the speaking tasks call for identification of principles or qualities as well as relationships to the problem addressed. A number of categories of relevant points for each task are identified in the Reasoning rating scales and equal weight is given to each acceptable idea up to four per point. Incorrect ideas and the manner in which ideas are presented are ignored. Thus, qualitatively defined scales result in a 36 point scale for reasoning in writing and a 24 point scale for reasoning in speaking.

METHOD

The College Outcome Measures Program of The American College Testing Program has been in existence for ten years. During this time, the Composite Examination from which the Reasoning and Communicating scales were derived has been utilized by a number of postsecondary institutions. Drawing upon the accumulated data base of freshman and senior samples for whom data on all parts of the Examination were available, a rescoring of the experimental reasoning scales was undertaken. After a preliminary study had indicated that these scales were likely to have an adequate level of reliability to allow meaningful interpretation, an equating study was conducted to allow data from four forms of the instruments to be pooled for analysis. This study also yielded multiple estimates of reliability.

The examination of relationships between communicating and reasoning skills was based on an analysis of data for 1589 freshmen from 13 institutions and 1366 seniors from 10 institutions. Data were available on subgroups of this population to examine relationships with the ACT Composite score, college grade point average (GPA), and Nelson-Denny reading scores. Data were available from six institutions which allowed cross-sectional comparisons of freshmen and senior samples.

VALIDITY

Efforts to establish the validity of the COMP Speaking, Writing, and Reasoning Assessments have been designed too show that the outcomes as measured by these instruments are relevant to effective functioning in a variety of adult roles in civic and work settings.

Judgments of effective functioning in adult roles are based on a complex mix of personal factors, skills and knowledge, and personality interrelationships. To expect to explain more than half of the variance using a few measures of proficiency in various skills would be unreasonable. Clear and significant relationships, however, should be evidenced. A series of studies have been conducted to explore these relationships, which are reported in Defining and Measuring General Education Knowledge and Skills. Six of these studies are summarized below.

1. Effective Volunteers: 66 older adults, all College of Arts and Sciences graduates of the University of Nebraska-Lincoln, were selected by the leaders of various volunteer groups as being effective members. The groups had previously been identified to represent various communicating or reasoning categories assessed by COMP. (Examples of these groups include docents at museums, members of advisory boards dealing with various social, scientific or artistic problems, or volunteers in agencies such as crisis centers or consumer protection agencies.) In this and the other studies reported below, the individuals completed the COMP Composite Examination, an instrument that included the Speaking and Writing Assessments. The Examination also included Solving Problems and Clarifying Values, the two components that make up the Reasoning Scale discussed in this paper. In 71% of the cases these participants in this study scored higher in their identified categories than in categories on the tests. This result indicates a clear relationship between performance on the measures and effective functioning in adult roles.

2. Bank Employees: 27 bank employees completed the Composite Examination. The criterion of effective functioning at the bank was the sum of ten supervisor ratings of various aspects of performance. The result of the analysis was a multiple correlation of .63 retween the ten summed supervisor ratings and three COMP subtests: **Clarifying Values**, Reading, and **Speaking**. (Scales related to the three skills under study in this paper will be highlighted. All correlation coefficients reported in each study were statistically significant beyond the .05 level.)

3. Business/Criminal Justice Management: 46 adults employed an average of ten years in business management or criminal justice management positions completed the Composite Examination. The criterion of effective functioning was the sum of sixteen supervisor ratings. While other COMP scales were more highly related to the ratings and loaded in the multiple regression analysis, the following simple Pearson Product-moment correlation coefficients with supervisor ratings were observed: **Solving Problems** .38, **Writing** .34, and **Speaking** .17.

4. Practice Teachers: 22 practice teachers completed the COMP Composite Examination. The criterion of effective functioning was based on the average of 39 scales included in teaching evaluations rated by Department of Education Faculty supervising these teachers. The result of the analysis was a multiple

correlation of .57 between the mean ratings and three COMP subtests: **Solving Problems**, **Writing**, and **Clarifying Values**. The Speaking scale also showed a relationship with the supervisor ratings as indicated by a simple Pearson correlation coefficient of .34.

5. Student Nurses: 33 student nurses completed the COMP Composite Examination. The criterion of effective functioning was the sum of seven clinical evaluations by hospital supervisors. Other COMP scales were more highly related and loaded in the multiple regression analysis. The following simple Pearson correlation coefficients were obtained with supervisor ratings: **Solving Problems** .27, **Writing** .17, **Speaking** .16.

6. Job/Social/Educational Status: While supervisor ratings are an important aspect of effective functioning, they alone cannot be viewed as adequate indicators of this concept. To broaden the definition of "effectively functioning adults," information on status indices and prestige hierarchies from professional sociological research journals was reviewed. The journals appeared to emphasize three dimensions of status differentiation: occupational prestige, social participation, and education. Based on this perspective, three proxy measures of effective functioning were utilized: Occupational Prestige (measured by Seigal's Sociological Index, 1975), Volunteer Activity (a ranking based on quantity and quality of involvement in volunteer organizations over a three-year period), and Education beyond the baccalaureate degree. These measures were given equal weight and summed to produce the variable "effective functioning."

   This index was used in a study of 174 college graduates (54 Blacks, 60 Whites, 62 Hispanics) who had been out of college an average of ten years. (Note: The White subgroup had typically been out of college 22 years and over-represented women, which is believed to have reduced the predictive power of these measures for the White subgroup.) The result of the analysis for the entrie group of 174 adults was a multiple correlation of .39 between the effective functioning index and two COMP scales: **Speaking** and **Writing**. Relationships with the index were also evidenced by Pearson correlation coefficients of .24 for **Solving Problems** and .25 for **Clarifying Values**.

   For the three ethnic subgroups in this sample, a multiple regression analysis was also completed. The COMP scales contributing to the multiple regression with the effectively functioning index were as follows: For Blacks, a multiple correlation coefficient of .38 was obtained with Functioning Within Social Institutions and **Speaking**. For Hispanics, a multiple R of .50 was obtained with **Speaking** and Computing. For Whites, a multiple R of .33 was obtained with **Writing**, Using the Arts, and **Clarifying Values**.

Each of the above studies involved only a small number of participants. Thus a single study would supply only modest support for the validity of these scales. However, the series of studies, all showing significant positive relationships in a variety of contexts with

a variety of criteria of effective functioning, add considerably to the belief in the predictive relevance of these measures to job performance.

RELIABILITY

For the assessment of communication skills in speaking and writing, issues of reliability have been addressed in a series of previous studies (Steele, 1979; Forrest and Steele, 1981; Trank and Steele, 1983). In current studies at ACT, coefficients of interrater agreement ranged from .87 to .99 for both speaking and writing. Among 15 comparisons in Speaking, the average coefficient was .92, and among 15 comparisons in Writing, the average coefficient was .94.

For the assessment of reasoning skills in speaking and writing, coefficients of interrater agreement have not previously been reported. However, results for combinations of scales of which these have been a part have typically yielded coefficients of .87 and above. Current studies yielded coefficients of .97 to .99. A study to examine interrater agreement for the application of reasoning scales to samples of speaking and writing yielded coefficients of .99, .99, and .98 for three pairs of evaluators.

Another aspect of reliability of both the communication and reasoning scales is that obtained from correlations of parallel forms of the instruments. In one study of parallel forms, 88 students at one institution completed two forms of the instruments and in a separate study, 102 students completed a different two forms. In each study the tests were administered in two days in a counterbalanced design. In these two studies examining four forms of the instruments, the following coefficients were obtained:

	Study I	Study II	Alpha r
Speaking Skills	.75	.76	.89
Writing Skills	.64	.71	.78
Reasoning Skills	.70	.74	.74
Speaking Reasoning	.60	.59	.64
Writing Reasoning	.58	.51	.69

These levels of relationship reflect the lower boundary of estimates of reliability. Analysis of internal consistency (Cronbach's Alpha) for the three scales of Speaking, Writing and Reasoning as independent measures produced estimates ranging from .74 to .89. The slightly lower levels of reliability for reasoning in speaking and writing separately suggests that these subscales lack sufficient reliability to stand alone. A replication of the use of Cronbach's Alpha reliability coefficient with 1568 freshmen yielded coefficients of .92 for Speaking, .79 for Writing, .75 for Reasoning, and .90 for the Total score combining these three scales. Thus, these scales were judged to be adequately reliable for use in program evaluation.

RESULTS AND DISCUSSION

The measures of reasoning appear to assess quite different skills than those measured by the communication scales for speaking and writing. The correlation coefficients between these two sets of scales are shown below:

	COMMUNICATION SKILLS (N=1589 Freshmen and 1366 Seniors)			
	Speaking		Writing	
	Fr	Sr	Fr	Sr
Reasoning Skills	.46	.36	.51	.49
Speaking Reasoning	.48	.38	.36	.34
Writing Reasoning	.29	.22	.48	.45

Clearly, the reasoning skills assessments, while evidencing an expected relationship with the communication skills, measure something different than the ability to communicate in speech and writing. (It should be noted that the relationship between speaking and writing communication scales is also a moderate .35 for freshmen and .36 for seniors.)

It is also desireable to examine the relationships between these scales and measures of general ability, such as ACT Composite score, college grade point average, and Nelson-Denny reading scorec. These correlation coefficients range between .15 and .50 as reflected in the table below. (Samples for whom these data were available vary.) Thus these measures do not simply reflect differing levels of academic achievement.

	ACT		GPA	N-D READING
	Fr	Sr	Sr	Sr
	N=986	N=826	N=455	N=181
Speaking Skills	.37	.34	.25	.22
Writing Skills	.50	.42	.37	.36
Reasoning Skills	.38	.32	.33	.25
Speaking Reasoning	.40	.29	.21	.29
Writing Reasoning	.47	.37	.32	.15

The previous section on Validity described a series of studies providing evidence of the relevance of the COMP assessments to functioning in adult roles out of college. Another critical relationship contributing to the validity of these assessments is their relevance to general education programs in college.

The instruments appear to differentiate quite well between groups at the same grade level and across grade levels. The sample of 1589 college freshmen at 13 institutions obtained a combined Reasoning score of 18 out of a possible 60 points. The sample of 1366 college seniors at 10 institutions obtained a Reasoning score of 25, a full standard deviation higher than freshmen.

		Speaking	Writing	Reasoning	Total
FRESHMEN	Mean	18.0	17.2	18.1	53.3
(N=1589 at 13 Inst.)	S.D.	6.9	4.6	7.3	15.1
	Range	0-36	2-33	0-42	8-107
SENIORS	Mean	22.3	19.8	25.0	67.1
(N=1366 at 10 Inst.)	S.D.	6.8	4.9	7.2	14.8
	Range	1-36	1-35	1-51	19-111
Fr/Sr Mean Differences		4.3	2.6	6.9	13.8

Means for the Speaking score were 18 and 22 for freshmen and seniors, with a maximum score of 36. The difference reflects two-thirds of a standard deviation. Least difference was reflected in the Writing score, with a mean of 17 for freshmen and 20 for seniors. The difference represents half a standard deviation. Again the maximum score was 36. As the instruments were designed to measure exiting seniors, a score at midrange was expected, and the measures were clearly sensitive to differences expected to occur over four years of college.

Mean scores in Reasoning for specific institutions ranged from 13 to 24 for freshmen samples and from 19 to 28 for senior samples. For Speaking, mean scores ranged from 14 to 22 for freshmen and 16 to 26 for seniors. For Writing, mean scores ranged from 14 to 21 for freshmen and 18 to 22 for seniors. (See Tables 1-6 in the Appendix which display freshman and senior sample distributions for these scales.)

While it appears that colleges clearly have an effect in developing these skills, this effect could be confounded with growth due simply to maturation. Thus, it would be desireable to study levels of skills of persons at the same age and ability as college seniors who have not attended college. Such a sample is difficult to obtain. It is possible to examine the performance of different age groups of seniors, however. The table below displays means for seniors of traditional age, age 23-30 and over 30 in the sample of 1366 seniors.

	SENIORS BY AGE GROUP		
	20-22	23-30	Over 30
	N=826	N=420	N=184
Speaking Skills	22.6	21.5	23.0
Writing Skills	19.9	19.4	20.2
Reasoning Skills	25.0	24.9	25.6

There appear to be no meaningful differences in levels of proficiency by age group on any of the three scales. Of course differences in means could be confounded by differences in other relevant variables, such as major, sex, or entering level of achievement. Thus these results should be interpreted cautiously as suggesting a trend toward maturation alone contributing little to differences in proficiency in these skills.

A second variable that might be expected to contribute to differences in exiting levels of proficiency in these skills is major area of interest. The table below displays senior means for the three broad areas of Social Sciences, Natural Sciences and Arts/Humanities.

	SENIORS BY AREA OF INTEREST		
	Soc.Sci.	Nat.Sci.	Arts/Hum.
	N=651	N=429	N=270
Speaking Skills	22.3	21.6	23.5
Writing Skills	20.0	18.8	20.8
Reasoning Skills	25.1	25.0	25.1

The Arts/Humanities subgroup evidenced slightly higher levels of proficiency in Speaking and Writing than the other groups. However, there appeared to be no difference in level of reasoning skills among the three groups. Again, these comparisons could be confounded by differences in other relevant variables.

Clear differences on all three scales were evidenced by gender. These differences were observed for both freshmen and seniors as the table below indicates:

	FRESHMEN		SENIORS	
	Women	Men	Women	Men
	N=968	N=618	N=700	N=661
Speaking Skills	18.5	17.2	22.9	21.6
Writing Skills	17.7	16.5	20.4	19.1
Reasoning Skills	18.8	17.1	26.2	23.7
ACT Composite	21.0	21.4	20.4	21.3

Differences were most pronounced on the Reasoning scale. Least differences were observed on the Speaking scale.

The question of growth from entry to exit from college and the meaningfulness of the exiting level of proficiencies in these skills remains to be explored. For six institutions, cross-sectional comparisons of growth from freshman to senior year were available on these scales.

		CROSS-SECTIONAL ESTIMATES OF MEAN GAIN			
Institution	Mean ACT	Speaking	Writing	Reasoning	Total
A (large public)	20	5.1	4.2	7.4	16.8
B (large public)	23	5.6	2.1	4.7	12.6
C (large public)	24	2.6	1.4	4.0	7.9
D (small private)	20	6.8	2.8	7.9	17.5
E (small private)	20	6.3	3.9	7.5	17.7
F (small private)	23	5.8	-1.3	5.4	9.9

As the table shows, most of these institutions achieved sizeable amounts of growth in Speaking skills. Only two institutions, one public and one private, demonstrated reasonably large gains in Writing skills. Three institutions evidenced sizeable gains in Reasoning skills. The total amount of growth on the three scales combined at these three institutions was more than a standard deviation unit over four years.

One way of considering the meaning of the exiting level of proficiency in each of these scales is to examine the percentage of students able to achieve some criterion level of proficiency. The arbitrary criterion selected was the middle level of performance as

defined by the rating scales. For Speaking and Writing, this represented making general contact with the appropriate audience, touching all points called for at a general level of development, and showing some fluency and control of language. For Reasoning, this represented being able to suggest two reasonable ideas per point on average. The following table displays the percentage of freshmen and seniors "passing" at this middle level of proficiency.

	Freshmen	Seniors
Speaking Skills	53%	77%
Writing Skills	47%	59%
Reasoning Skills	7%	27%
Total Score	19%	55%

This analysis suggests that a majority of the college seniors in this sample evidence a middle level of proficiency in Speaking and Writing as defined by the rating scales. Only about a fourth of the seniors achieve this level of performance in Reasoning. The degree to which a concerted effort to emphasize and develop reasoning skills would result in a substantial increase in proficiency is unknown. Clearly, as the preceeding comparison of six institutions indicated, some colleges are already doing a better job than others.

Analysis of the COMP assessments of Reasoning, Speaking and Writing suggests that these scales provide a viable way to measure such outcomes for both individuals and program evaluation purposes. They clearly can discriminate among individuals and programs. The use of such standardized measures can allow colleges to examine the question of "value added" or growth from entry to exit in their programs. Such use can also provide comparisons of exiting levels of proficiency with samples of students at other participating institutions.

While writing and speaking skills are highly valued and sometimes taught together, they are recognized as different. This study suggests that reasoning appears to be less tightly linked to writing and speaking than commonly believed. Past studies have encouraged an emphasis on thinking and problem solving as a useful component of instruction in communication skills. It is time for experimental studies to examine growth in reasoning and its effect on effective communication.

REFERENCES

Applebee, Arthur N. Writing and Reasoning. Review of Educational Research, Vol. 54, No. 4, Winter 1984, pages 577-596.

Forrest, Aubrey and Joe M. Steele. Defining and Measuring General Education Knowledge and Skills. College Outcome Measures Program Technical Report 1976-1981, The American College Testing Program, 1982.

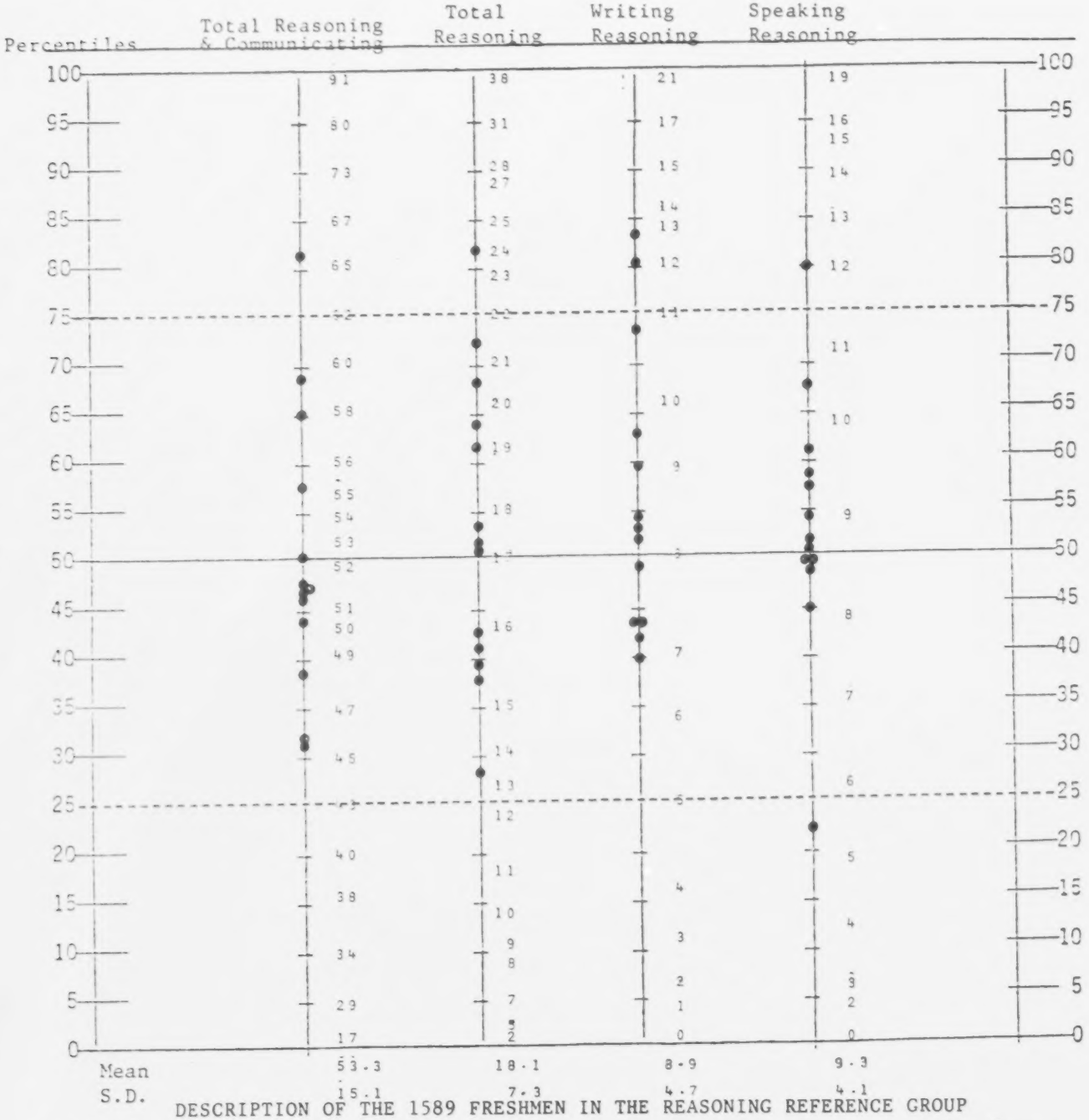
Reading, Thinking, and Writing. National Assessment of Educational Progress, November 1981.

Steele, Joe M. The Assessment of Writing Proficiency Via Qualitative Ratings of Writing Samples. Paper presented at the Annual Meeting of the National Council on Measurement in Education, San Francisco, April 1979.

Trank, Douglas M. and Joe M. Steele. Assessing Growth in a Communication Skills Program. Communication Education, Vol. 32, No. 2, April 1983, pages 227-236.

Table 1
1986 COMP FRESHMAN REFERENCE GROUP NORMS FOR REASONING
BASED ON 1589 FRESHMEN AT 13 INSTITUTIONS

Directions: Circle the place where your score falls on each scale. Refer to the Percentiles to judge your performance compared to freshmen in the reference group. (For example, if your Total score was 17, you scored above 50% of the freshmen in this comparison group.)



DESCRIPTION OF THE 1589 FRESHMEN IN THE REASONING REFERENCE GROUP

Area of Interest
37% Social Science
43% Natural Science
20% Arts/Humanities

61% Women
39% Men

ACT Composite or equivalent for SAT Total scores available for 986 students. Mean = 21.1

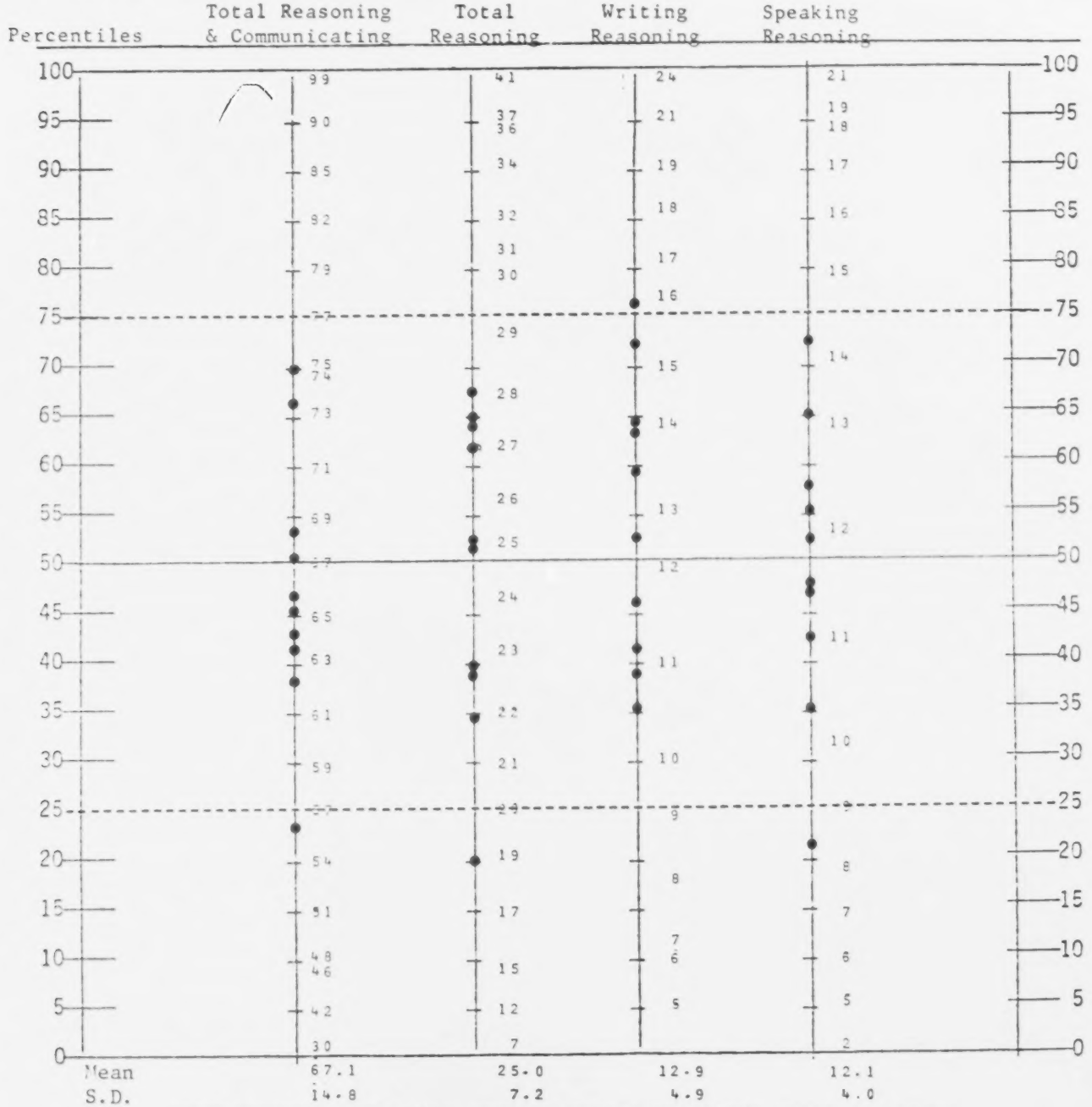
Range:
1% below 10
4% ACT 10-12
9% ACT 13-15
15% ACT 16-18
23% ACT 19-21
20% ACT 22-24
17% ACT 25-27
9% ACT 28-30
2% above 30

Age Range
95% below age 20
3% age 20-22
2% over 22

Table 2

1986 COMP SENIOR REFERENCE GROUP NORMS FOR REASONING
BASED ON 1366 SENIORS AT 10 INSTITUTIONS

Directions: Circle the place where your score falls on each scale. Refer to the Percentiles to judge your performance compared to seniors in the reference group. (For example, if your Total score was 25, you scored above 50% of those in this comparison group.)



DESCRIPTION OF THE 1366 SENIORS IN THE REASONING REFERENCE GROUP

Area of Interest
48% Social Science
32% Natural Science
20% Arts/Humanities

51% Women
49% Men

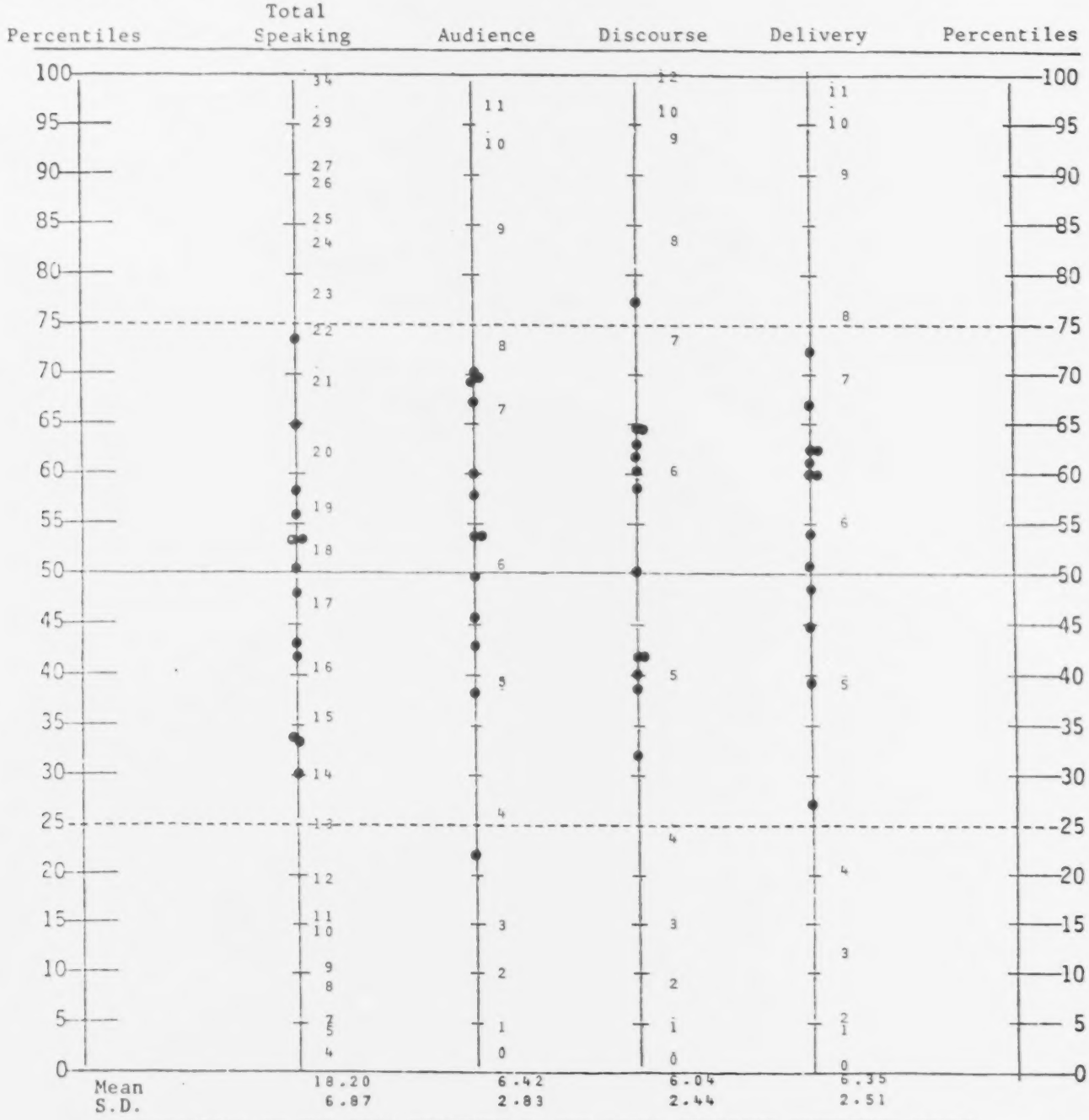
ACT Composite or equivalent for SAT Total scores available for 826 students. Mean = 20.8

Range:
3% below 10
7% ACT 10-12
10% ACT 13-15
14% ACT 16-18
17% ACT 19-21
20% ACT 22-24
18% ACT 25-27
8% ACT 28-30
4% above 30

Age Range
55% age 20-22
31% age 23-30
14% over 30

Table 3
1986 COMP FRESHMAN REFERENCE GROUP NORMS FOR SPEAKING
BASED ON 2094 FRESHMEN AT 19 INSTITUTIONS

Directions: Circle the place where your score falls on each scale. Refer to the Percentiles to judge your performance compared to freshmen in the reference group. (For example, if your Total score was 18, you scored above 50% of the freshmen in this comparison group.)



DESCRIPTION OF THE 2094 FRESHMEN IN THE TOTAL SPEAKING REFERENCE GROUP

Area of Interest
38% Social Science
41% Natural Sciences
21% Arts/Humanities

Age Range:
95% 19 or below
3% 20-22
2% 23-30
1% over age 30

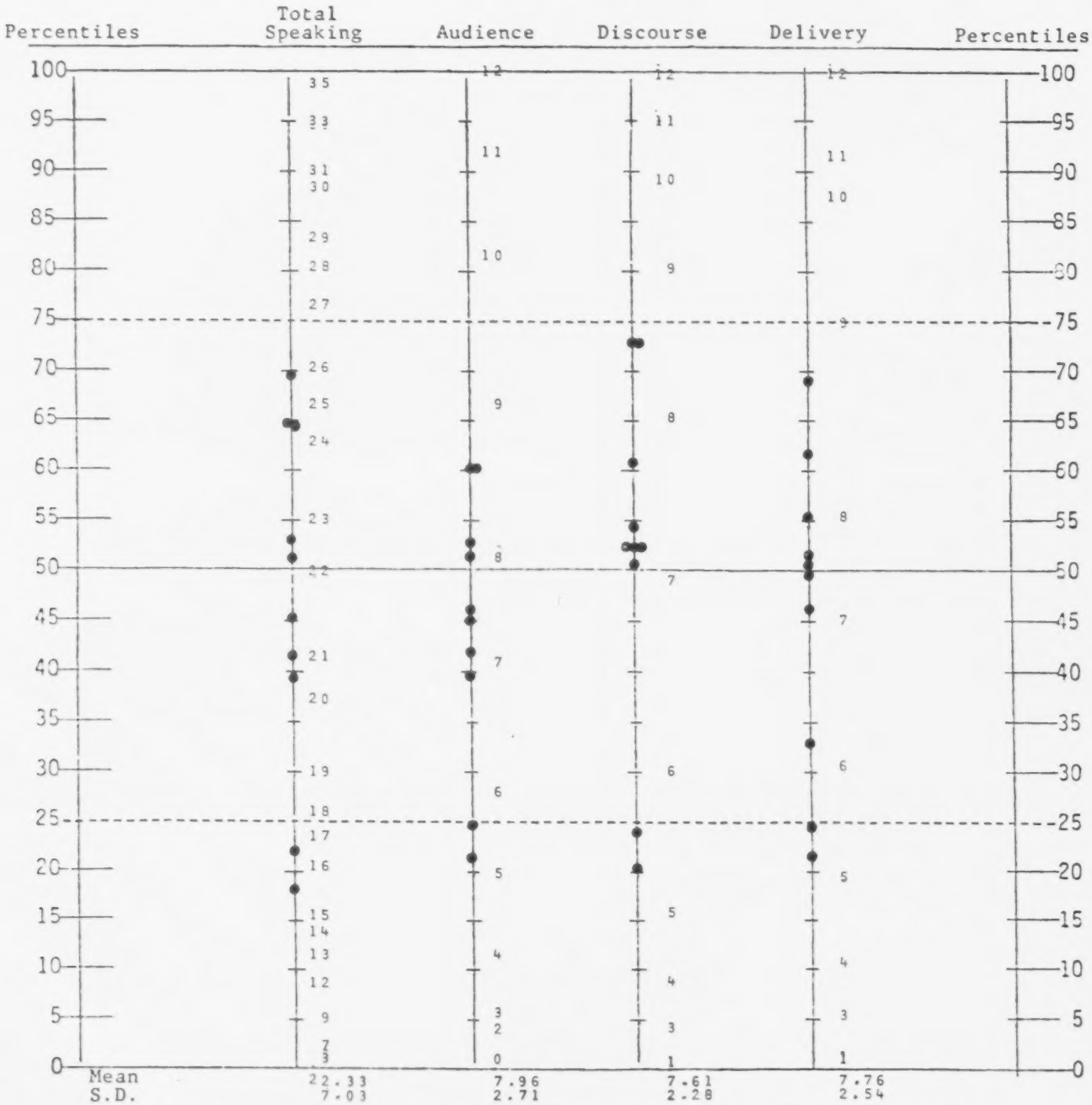
ACT Composite or equivalent for SAT Total scores available for 1348 students. Mean = 20.8

Range:
1% below 10
4% ACT 10-12
10% ACT 13-15
16% ACT 16-18
23% ACT 19-21
20% ACT 22-24
15% 25-27
8% ACT 28-30
2% above 30

36% Men
64% Women

Table 4
1986 COMP SENIOR REFERENCE GROUP NORMS FOR SPEAKING
BASED ON 2747 SENIORS AT 24 INSTITUTIONS

Directions: Circle the place where your score falls on each scale. Refer to the Percentiles to judge your performance compared to seniors in the reference group. (For example, if your Total score was 22, you scored above 50% of those in this comparison group.)



DESCRIPTION OF THE 2747 SENIORS IN THE TOTAL SPEAKING REFERENCE GROUP

Area of Interest
41% Social Science
27% Natural Science
21% Arts/Humanities

Age Range:
51% 20-22
32% 23-30
16% over age 30

ACT Composite or equivalent for SAT Total scores available for 1857 students. Mean = 19.5

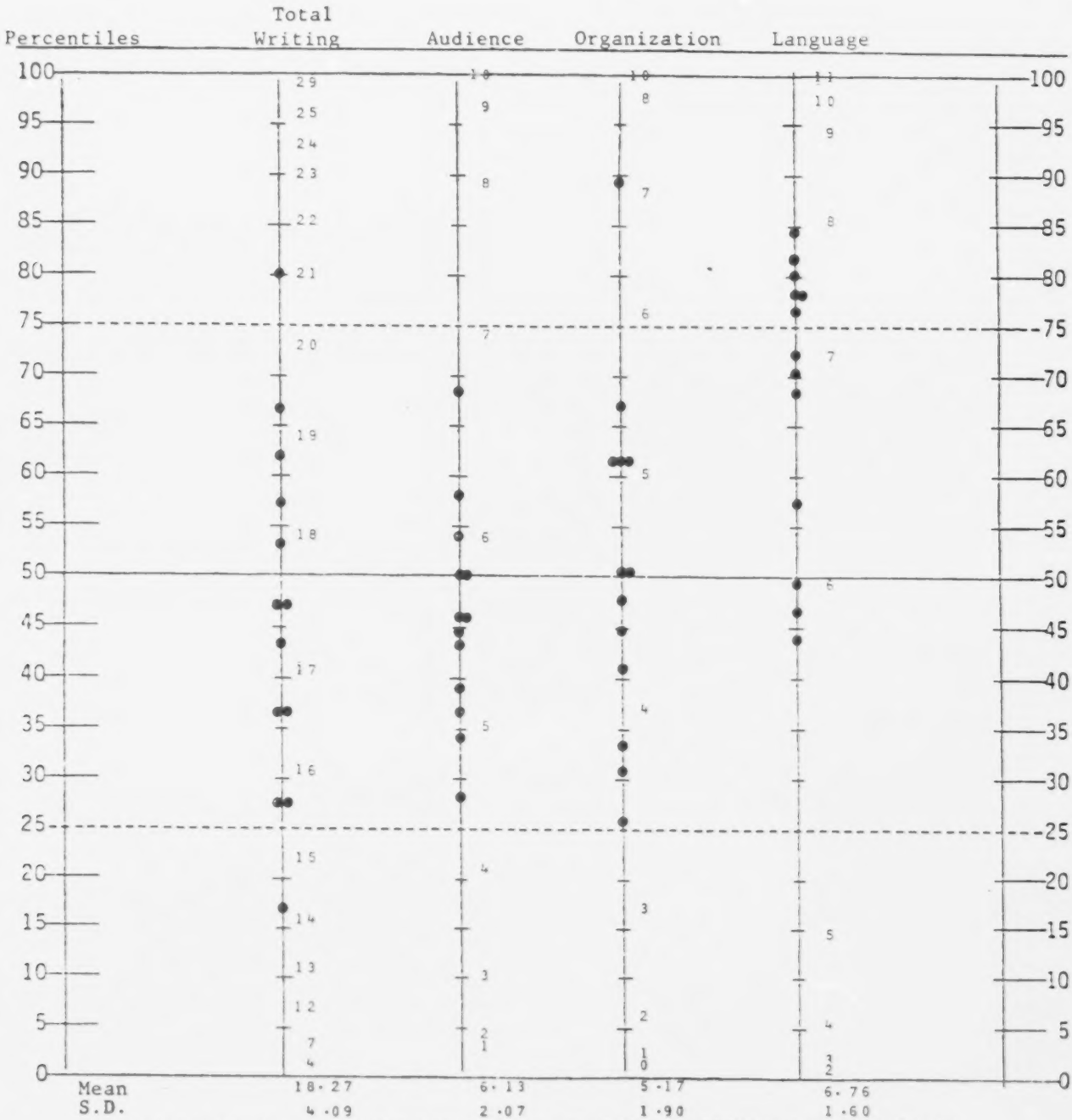
Range:
3% below 10
11% ACT 10-12
14% ACT 13-15
16% ACT 16-18
16% ACT 19-21
18% ACT 22-24
14% ACT 25-27
6% ACT 28-30
2% above 20

46% Men
54% Women

Table 5

1986 COMP FRESHMAN REFERENCE GROUP NORMS FOR WRITING
BASED ON 4167 FRESHMEN AT 22 INSTITUTIONS

Directions: Circle the place where your score falls on each scale. Refer to the Percentiles to judge your performance compared to freshmen in the reference group. (For example, if your Total score was 18, you scored above 50% of the freshmen in this comparison group.)



DESCRIPTION OF THE 4167 FRESHMEN IN THE TOTAL WRITING REFERENCE GROUP

Area of Interest
43% Social Sciences
35% Natural Sciences
22% Arts/Humanities

Age Range:
94% 19 or below
4% 20-22
2% 23-30
1% over age 30

ACT Composite or equivalent for SAT Total scores available for 2409 students. Mean = 21.0

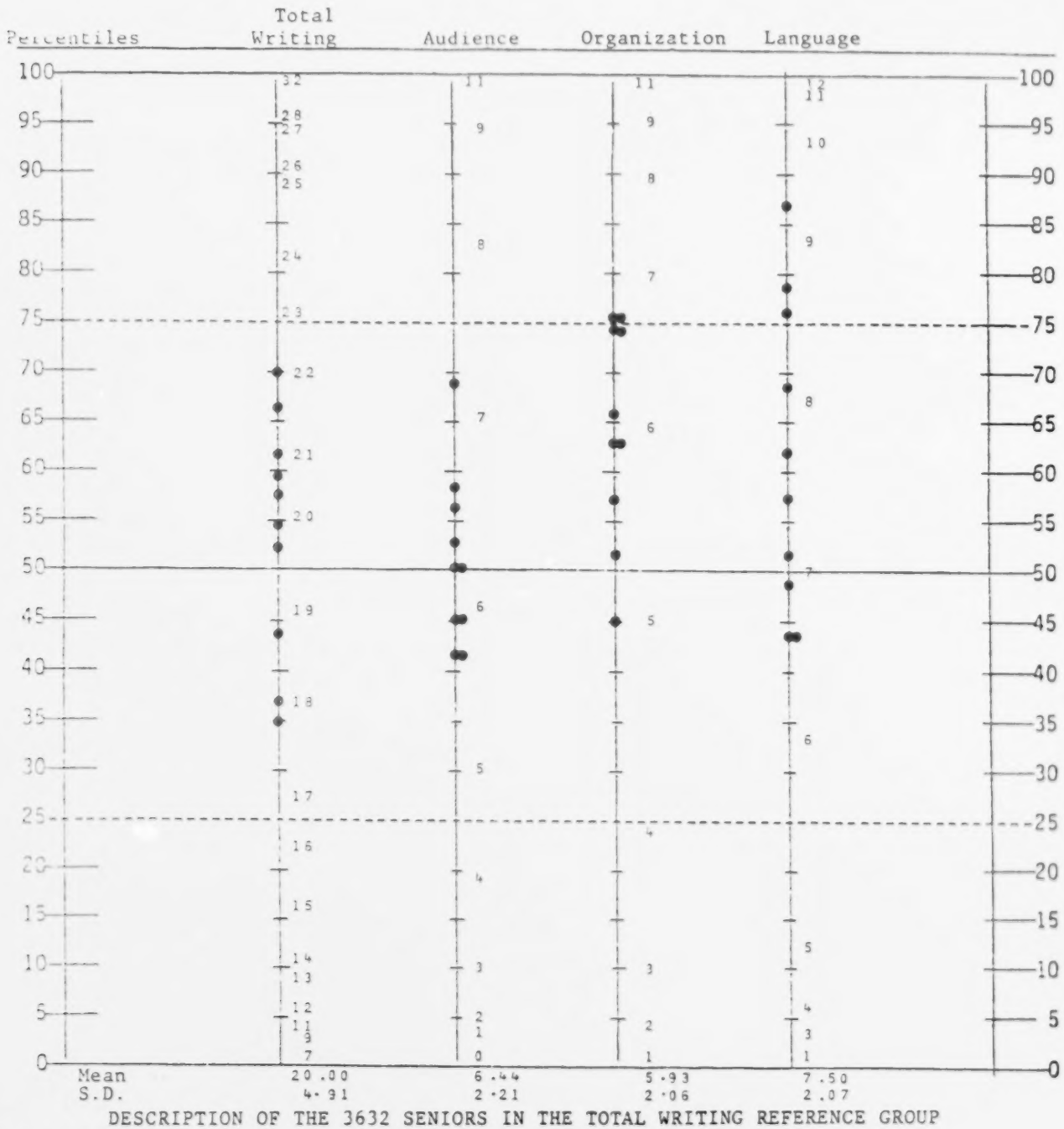
Range:
1% below 10
4% ACT 10-12
10% ACT 13-15
16% ACT 16-18
22% ACT 19-21
21% ACT 22-24
18% ACT 25-27
8% ACT 28-30
2% ACT above 30

37% Men
63% Women

Table 6

1986 COMP SENIOR REFERENCE GROUP NORMS FOR WRITING
BASED ON 3632 SENIORS AT 27 INSTITUTIONS

Directions: Circle the place where your score falls on each scale. Refer to the Percentiles to judge your performance compared to seniors in the reference group. (For example, if your Total score was 19, you scored above 50% of the seniors in this comparison group.)



DESCRIPTION OF THE 3632 SENIORS IN THE TOTAL WRITING REFERENCE GROUP

Area of Interest
46% Social Sciences
31% Natural Sciences
23% Arts/Humanities

Age Range:
57% 20-22
29% 23-30
13% over age 30

ACT Composite or equivalent for SAT Total scores available for 2507 students. Mean = 20.1

Range:
2% below 10
9% ACT 10-12
12% ACT 13-15
16% ACT 16-18
17% ACT 19-21
20% ACT 22-24
16% ACT 25-27
7% ACT 28-30
2% above 30

47% Men
53% Women